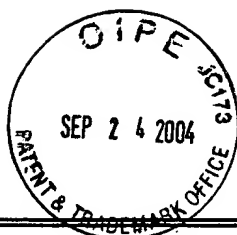


S/N 09/548,913



IFW AF
PATENT

Atty. Docket No. RAL9-00-0018

CERTIFICATE OF MAILING (37 C.F.R. 1.8(a))

I hereby certify this correspondence is being deposited with the United States Postal service with sufficient postage as first class mail in an envelope addressed to: Mail Stop Appeal Brief-Patents; Commissioner for Patents, P.O. Box 1450, Alexandria, VA 22313-1450 on 9/21/2004,

by Karen Orzechowski

Signature: Karen Orzechowski

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

In re application of	:	Date: September 21, 2004
B. M. Bass, et al.	:	IBM Corporation; 9CCA/B002
	:	P.O. Box 12195
Serial No. 09/548,913	:	Research Triangle Park,
	:	North Carolina 27709
Filed: 4/13/2000	:	Customer Number 25299
	:	
For: METHOD AND SYSTEM FOR	:	Unit: 2127
NETWORK PROCESSOR	:	
SCHEDULING OUTPUTS USING	:	Examiner: Niles R. Shah
DISCONNECT/RECONNECT FLOW QUEUES:	:	

Mail Stop Appeal Brief- Patents
Commissioner for Patents
P.O. Box 1450
Alexandria, VA 22313-1450

**TRANSMITTAL OF APPEAL BRIEF
(PATENT APPLICATION-37 CFR 1.192)
AND PETITION FOR EXTENSION OF TIME**

Sir:

1. Transmitted herewith in triplicate is the APPEAL BRIEF in this application with respect to the Notice of Appeal filed on May 21, 2004.

2. STATUS OF APPLICANT

This application is on behalf of

 X other than a small entity
 small entity

verified statement: attached already filed

3. FEE FOR FILING APPEAL BRIEF

Pursuant to 37 CFR 1.17(f) the fee for filing the Appeal Brief is:

☐ Small entity \$165.00☒ Other than a small entity \$330.00

Appeal Brief fee due: \$ 330.00

4. EXTENSION OF TERM

The proceedings herein are for a patent application and the provisions of 37 CFR 1.136 apply.

☒ (a) Application petitions for an extension of time under 37 CFR 1.136 (fees: 37 CFR 1.17(a)-(d)) for the total number of months checked below:Extension (months)Fee for other than a small entity☐ one month

\$ 110.00

☒ two months

\$ 420.00

☐ three months

\$ 950.00

☐ four months

\$1,480.00

☐ (b) Applicant believes that no extension of term is required. However, this conditional petition is being made to provide for the possibility that applicant has inadvertently overlooked the need for a petition and fee for extension of time.**5. TOTAL FEE DUE**

The total fee due is:

Appeal brief fee \$ 330.00

Extension fee (if any) \$ 420.00

TOTAL FEE DUE \$750.00

6. FEE PAYMENT☐ Attached is a check in the sum of \$☒ Charge Account No. 09-1990 the sum of **\$750.00**

(a duplicate of this transmittal is attached)

7. FEE DEFICIENCY☒ If any additional extension and/or fee is required, this is a request therefor and to charge Account No. 09-1990.By: Joscelyn G. Cockburn,
Attorney of Record Reg. No.: 27,069
Customer Number 25299

SERIAL NO. 09/548913



PATENT
Docket RAL9-00-0018

CERTIFICATE OF MAILING (37 C.F.R. 1.8(a))

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NETWORK PROCESSOR	:	
SCHEDULING OUTPUTS USING	:	Examiner: Niles R. Shah
DISCONNECT/RECONNECT FLOW	:	
QUEUES	:	

APPEAL BRIEF

Mail Stop Appeal Brief- Patents
Commissioner for Patents
P.O. Box 1450
Alexandria, VA 22313-1450

Sir:

This is an appeal from the Final rejection of claims 1-3, and 5-13 of this application.
An appendix containing a copy of the claims is attached.

I. REAL PARTY IN INTEREST

The real party in interest is International Business Machines Corporation (IBM),
Assignee of the present application.

II. RELATED APPEALS AND INTERFERENCES

None.

III. STATUS OF CLAIMS

Claim 4 has been canceled, without prejudice, as a result of a non-elected
specie of a two-way restriction imposed by the Examiner in which claims 1-3 and claim
4 were deemed drawn to different inventions. Claims 1-3 were elected for examination.
Claims 5-13 were added by amendment. Claims 1-3 and 5-13 are on appeal.

IV. STATUS OF AMENDMENT

No amendment has been filed subsequent to the Final Rejection.

V. SUMMARY OF INVENTION

The present invention relates to a scheduling system 40, Figure 1, which schedules packets or frames from a network device, such as a network processor 10, Figure 1 through a network attachment, such as ENET/ATM Framer 38, to a communications network.

The primary function of the scheduling system is to allocate available bandwidth to users to meet different types of levels of service requirements set forth in service agreements between said users and network service providers. The different type of levels of service requirements are referred to collectively as Quality of Service (QoS).

It would be desirable to have a scheduling system that has maximum flexibility to allow for different type and levels of services including minimum bandwidth, minimum bandwidth with allowance for bursts, economic services providing for a "best effort" service either with or without a minimum bandwidth etc. (See page 8, lines 15-23, appellants' specification). Such a flexible scheduling system is not available in the prior art and is provided by the claimed invention.

Figure 3 shows a graphical representation of the scheduling system including a plurality of flow queues 210, time based calendars 220, 230, 250, weighted fair queueing (WFQ) calendars 240 and target port queues 260 (page 16, lines 18-20, appellants' specification). The calendars determine when a frame is to be moved from a flow queue to a port queue. To this end when a packet is placed in a flow queue the flow queue id is placed at one of the N locations of the selected calendar. A pointer is used to represent a flow queue location within a calendar. (Page 18, lines 1-9, appellants' specification.)

Each time based calendar has four Epochs (0-3) show as overlapping rectangulars Figure 3 and (expanded view) rectangulars Figure 4. A current pointer,

indicating position or location next to be serviced, 312 and current time 320 is associated with each Epoch. A signal termed "Scheduler tick" 330 advances the current pointer and current time. The locations on each Epoch are serviced in ascending order from location 0 to 511 and wraps back to 0. (Page 18, lines 17 through page 19, lines 1-12, appellants' specification.)

The maximum flexibility and Quality of Service (QoS) are achieved by the placement of queues on the calendar and its movement once placed on the calendar. The queue is not attached to a calendar location until a packet or frame to be scheduled is placed in it. The queue is then attached or connected to a location on at least one of the calendars and is moved in accordance with the claimed invention. Every Scheduler Tick (see Figure 4) a queue is serviced. Servicing a queue includes identifying a queue on a calendar from which a packet or frame will subsequently be transmitted to one of the port queues 260 (Figure 3). When a queue is serviced if it still has at least one packet to be scheduled the queue is detached (disconnect) from its current location on the calendar and re-attached (re-connect) at another (second) location on the calendar. The location number for the second location is usually higher than the location number of the present location. The second location also indicates the detached queue will receive another servicing at a later time.

If a queue becomes empty it is detached from its calendar location (only queue with at least one packet to be scheduled is permitted on the calendar). As soon as a frame is placed in the detached queue it is re-attached at a calendar location pointed to by the current time pointer (Figure 4). Depending on the location of current time pointer the disconnection/reconnection could give the queue a more favorable location, on the calendar, whereat it would be serviced at an earlier time than it would have if the queue was placed at a calendar location calculated after each service. (See page 20, lines 1-7, appellants' specification). To prevent this unintended result which could adversely

affect QoS agreements the process set forth on pages 20-24 (appellants' specification) and claims 1-3 and 5-13 is practiced.

VI. ISSUES

- A. Whether claims 2 and 7 are unpatentable under 35 USC 102(b) as being anticipated by Anderson (U.S. Patent No. 5,465,335).
- B. Whether claims 1, 5, 6 and 8-13 are unpatentable under 35 USC 103(a) over Blelloch et al. (U.S. Patent 5,768,594) further in view of Anderson (U.S. Patent 5,465,335) and in further view appellants' admitted prior art, pages 1-9.
- C. Whether claim 3 is unpatentable under 35 USC 103(a) over Anderson (U.S. Patent 5,465,335).

VII. GROUPING OF CLAIMS

There are three groups of claims.

Group 1 consists of claims 2 and 7 which do not stand or fall together.

Group 2 consists of claims 1, 5, 6 and 8-13 which do not stand or fall together.

Group 3 consists of claim 3.

VIII ARGUMENTS**A. ERROR IN CONSTRUCTION OF REFERENCES**

U.S. Patent 5,465,535 (Anderson) and U.S. Patent 5,768,594 (Blelloch) are the prior art relied on, in part, to reject the claims. A review of each of the patents seems to suggest the Examiner misconstrued the teachings in each of the references and as a result of the misconstruction erroneously concluded the claims of appellants' invention are unpatentable.

U.S. Patent 5,465,335 (Anderson) teaches a multi-tasking processor in which tasks to be executed in the processor 10 (Figure 1) are prioritized and queued in CPU queue 20. The task at the "head" of the CPU queue 20 retains possession of microprocessor 10 for that task. If a task of higher priority is placed in the queue, the currently running task is replaced by the higher priority task at the head of CPU queue 20 and the task of higher priority executes (col. 4, lines 6-34).

Anderson method of processing task is discussed at page 7, lines 5-8, appellants' specification where it is characterized as absolute priority in which the highest priority work is processed first and the lowest priority work may never get processed. Needless to say the likelihood of this prior art technique not being able to process lowest priority work is a problem which is solved by appellants' claimed invention. In addition, whereas appellants' invention is used to provide QoS such as minimum bandwidth etc. in accordance with service agreements Anderson's invention, due to absolute priority limitation, could not be used in such an environment. As a consequence appellants' invention solves problems inherent in Anderson and is suitable for use in environments in which Anderson cannot be used.

With respect to the rejection the Examiner's assertion that Anderson teaches elements of appellants' claims identified at pages 2, 3 and 6 (first 3 lines) Final Office Action, Paper #9, appears to be in error. Appellants have reviewed Anderson including the sections identified by the Examiner and are of the opinion no reasonable construction could ever lead an artisan to conclude appellants' claims are suggested by Anderson.

U.S. Patent 5,768,594 teaches the use of a task queue and status buffer manager to schedule parallel processors. The patent uses the ordering of tasks and assignment of high priority to early available task in a sequential scheduling to select a subset of the available tasks for parallel processing. (See col. 3, lines 20-50). The Examiner's conclusions that Blelloch teaches elements of appellants' claim 1 appears to be error.

It should be noted none of the prior art references teaches, suggests or otherwise implies, as is claimed in appellants' claims, use of a calendar in any way much less its use in scheduling packets, recited in the Claims, resulting in QoS fulfilment.

**B. ANDERSON DOES NOT TEACH ANY OF THE PROCESS
RECITED IN CLAIMS 2 AND 7**

Claims 2 and 7 are rejected as being anticipated by Anderson. The claimed process requires a calendar, a queue, determination if the queue was on the calendar and position the queue in the way stated in the claims. As argued above and incorporated herein by reference, Anderson uses a queue and absolute priority to

present tasks to a processor. Therefore, Anderson does not anticipate claims 2 and 7, since a claim is anticipated only if each and every element or step as set forth in the claim is found either expressly or inherently described in a single prior art reference. *Vordegaaal Bros. V. Union Oil Company of California*, 814 F.2d 628, 631, 2 USPQ 2d 1051 (Fed. Cir. 1987).

In addition, claim 7 is patentable because of its dependency on claim 2. Claim 7 is also separately patentable in that it specifically identifies the action (attachment) to be taken. No such action with respect to a calendar is stated expressly or inherently in Anderson. Therefore, claim 7 is not anticipated.

C. REJECTION OF CLAIM 3

Claim 3 is rejected under 35 USC 103(a) as being unpatentable over Anderson (U.S. Patent 5,465,335).

With respect to this rejection, appellants assert the invention disclosed in Anderson is different from the invention in claim 3. As a consequence the teachings of Anderson could not possibly suggest claim 3.

As argued above and incorporated herein by reference Anderson teaches an absolute priority scheme in moving task from a CPU queue to the CPU for execution. In contrast, claim 3 relates to positioning (placing) queues on a scheduling calendar and aging of queues to determine validity of stored parameters. The aging of queues is necessary in appellants' design because time stamps are associated with the queues and knowing when the time stamps are no longer valid is required for proper operation of the scheduler. Due to the difference in invention claim 3 is not obvious.

The Examiner contends that teachings at col. 4, lines 6-64 and col. 12, lines 7-45 would suggest claim 3.

Appellants respectfully disagree and argue to the contrary that those teachings would more than likely lead an artisan in the opposite direction (away) from claim 3. The teachings in the reference and the named sections in particular seem related to task prioritization so that high priority tasks are processed while low priority tasks are delayed. The teach away from is suggested evidence of non-obviousness.

In addition, appellants argue there is no motivation suggested in Anderson for its modification suggested by the Examiner to meet teachings of claim 3. Motivation to modify is a necessary and required element of a rejection under 35 USC 103. Failure, as is here, to do so indicates the Examiner has not made a case of prima facie obviousness. As argued above and incorporated herein by reference, Anderson is concerned with processing high priority task. Therefore, this aging of queues as recited in appellants' claim would not be of interest to Anderson. Moreover, appellants could not find any suggestion of aging of queues in Anderson. As a consequence claim 3 is patentable over Anderson.

D. REJECTION OF CLAIMS 1, 5-6 AND 8-13

Claims 1, 5-6 and 8-13 are rejected under 35 USC 103 as being unpatentable over Blelloch et al. (U.S. Patent 5,768,594) further in view of Anderson (U.S. Patent 5,465,335) and appellants' admitted prior art pages 1-9.

1. EXAMINER'S COMBINATION FAILS TO TEACH
ALL LIMITATIONS OF CLAIMS

In order for a rejection under 35 USC 103 to stand the Examiner must make out a prima facie case of obviousness. One of the necessary elements of a prima facie case of obviousness is that the combination of references must teach or suggest all of the claims' limitations. MPEP 2142 and cases cited therein.

It is appellants' contention the combination of Blelloch et al., Anderson and information discussed on page 7 of appellants' specification do not suggest or teach the following limitations of appellants' claims:

- (a) With respect to claims 1, 5-6 and 8-13, calendar attaching queues to calendar detaching and reattaching
- (b) With respect to claim 1, time based calendar , time independent calendar placing source at a location of a calendar and preventing the source from being placed at a location ahead of a calculated location placing each source into a calendar location and which moves the source to a different place in the calendar after servicing the source.
- (c) Claims 5 and 6 depend on claim 1 and inherit the limitations in (b) due to dependency.
- (d) With respect to claim 8, time stamp as a stored parameter.
- (e) With respect to claim 9, time based calendar , location of source in time based calendar and inhibiting source from being placed at a location ahead of a predefined location.
- (f) With respect to claims 10-13, none of the processes recited therein are taught in the combined references.

As argued above and incorporated herein by reference Blelloch teaches use of task queues and buffers to send tasks to parallel processors. Anderson teaches priority task queue to send task to a single processor for processing. None of the references single or in combination suggest the limitations as set forth above. Therefore, the Examiner fails to make out a prima facie case of obviousness and the claims are patentable over the art of record.

Appellants are mindful of the Examiner's assertion, set forth in the Final Office Action (Paper #9) that elements of appellants' claims are suggested in the references.

Appellants respectfully disagree with these assertions and argue as set forth above and incorporated herein by reference it appears as if the Examiner erred in construing the references and as a result erroneously concluded disclosure of appellants' claims in them.

2. NO MOTIVATION TO COMBINE

Another criterion for making out a prima facie case of obviousness is there must be some suggestion or motivation either in the references themselves or in the knowledge generally available to one of ordinary skill in the art to combine reference teachings (MPEP 2142).

It is appellants' contention this criterion is not met in the present case. With respect to the system claims 1, 5, 6, 8 and 9, they all call for a calendar and mechanism for determining location whereat a flow is to be placed on said calendar. The references cited and relied on by the Examiner include teachings set forth on page 7, appellants' specification. The specific teaching is stated, to wit: "Other systems have

used a weighted priority technique implemented in the form of round robin - which serves all queues . . . “ (appellants’ specification, page 7, lines 13-19). It is appellants’ contention this prior art teaching teaches away from appellants’ invention in that it teaches the use of multiple queues whereas the claims call for a calendar and determining an optimum location --on said calendar-- whereat a source containing flows is placed. Because this reference teaches away it is appellants’ assertion there is no motivation to combine.

Moreover, since none of the three references suggest the use of calendars is further evidence of the references teaching away from the claims.

Regarding claims 10-13 (method claims), they all require a calendar and process of moving a queue to different location on the calendar as recited in the claims. Based upon the argument raised above in support of the system claims, appellants assert there is no motivation in the references to form a combination that would render claims 10-13 obvious.

Based upon the above the Examiner has not made out a prima facie case of obviousness. Therefore, claims 1, 5-6 and 8-13 are patentable over the art of record. Appellants are aware of the Examiner’s arguments, to wit: “The switch between different queues is considered the disconnecting and reconnecting”. Final Office Action, paper No. 9, page 6, last two lines of first paragraph. Appellants respectfully disagree with this position and argue this interpretation seems illogical since switching between queues implies multiple structures whereas disconnect and reconnect implies a single structure. Finally, the structures are different, one being a queue (prior art structure), the other a calendar (claimed structure).

**3. NOVEL STRUCTURE, NOVEL PROCESS COUPLED WITH
BENEFITS AND/OR SOLVING PROBLEMS - EVIDENCE OF
UNOBVIOUSNESS**

With respect to the system claims 1, 5, 6, 8, they recite novel structure including a calendar . . . mechanism to determine calendar location as stated in the claims. As a result of this novel structure maximum flexibility allowing for different types of services etc. (see page 8, lines 15-33, appellants' specification) are provided. These are characterized as benefits to the user. It is appellants' contention novel structure and benefits are evidence of unobviousness.

As argued above and incorporated herein by reference, the Anderson reference provides absolute priority scheduling wherein low priority tasks may not get serviced. This is regarded as a problem. In contrast in appellants' claim structure all packets regardless of priority get service according to service level agreement.

As a consequence appellants argued the problem which is present in the Anderson patent is solved by the claimed invention. The novel structure and solution of prior art problem are evidence of non-obviousness.

With respect to claims 10-13 (methods) the argument set forth above in this section is equally applicable to the method claims. As a consequence they provide novel processes, solve prior art problems and provide benefits, which are indicia of unobviousness.

Patentability of Claim 5

Claim 5 is patentable due to dependency on claim 1.

In addition, claim 5 is separately patentable. The claim calls for plurality of sources include plurality of queues. By using queues multiple packets with like characteristics can be stored in a single queue and only information about the queue is recorded. Without the ability to queue several packets with common characteristics information about each packet would have to be recorded which would require more storage than is needed to store identity of one queue storing several packets. The reduction in storage space is a benefit which renders claim 5 separately patentable.

Patentability of Claim 6

Claim 6 is patentable due to dependency on claim 1.

In addition, claim 6 is separately patentable. The claim calls for re-attaching the queue upstream. This feature in part distinguishes the claim from the absolute priority approach of the reference and as a consequence separately patentable. This feature also adds a degree of fairness to users in that a queue that is receiving packets rapidly does not lock out other queues from being serviced since once a queue is serviced it is detached with possible attachment to be serviced at a later time.

Patentability of Claim 8

Claim 8, due to its dependency, is patentable over art of record for reasons set forth above. In addition claim 8 is separately patentable in that it states the stored

parameter includes time stamps. Time stamping relates to benefits of reduced hardware. (See page 26, lines 13-18, appellants' specification.) Because of its dependency claim 8 provides a novel structure, when coupled to the benefits implies unobviousness.

In claim 8, "method", should have been –system–. This is an inadvertent error. Appellants regret any inconvenience this may have caused.

Claim 10 is a method claim patentable over the art of record for reasons set forth above.

Patentability of Claim 11

Claim 11 is patentable due to dependency on claim 10.

In addition, claim 11 is separately patentable for reasons set forth in supporting separate patentability of claim 6 and said arguments are incorporated herein by reference.

Patentability of Claim 12

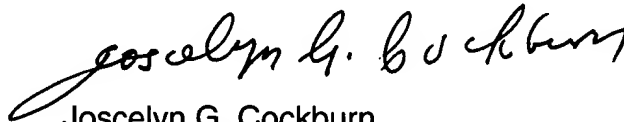
Claim 12 is patentable due to its dependency on claim 10.

In addition, claim 12 is separately patentable. The claim calls for attaching queue by writing its i.d. in a stack at location. This approach requires less space to record information about many packets as opposed to recording the identity of each packet. The conservation of space (memory) is a benefit which makes the claim separately patentable.

CONCLUSION

Based upon the above arguments, the appealed claims define patentable subject matter and are not anticipated or made obvious by the cited art. As a consequence the Examiner's final rejection of claims 1-3 and 5-13 should be reversed.

Respectfully submitted,

A handwritten signature in black ink, appearing to read "Joscelyn G. Cockburn", written in a cursive style.

Joscelyn G. Cockburn
Reg. No. 27,069
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Appendix of Rejected Claims:

1. A system for periodically moving information units from a plurality of sources to an output destination based on information stored about each of the plurality of sources, the system comprising:
 - a time-based calendar which handles some of the information units based on the information stored about the plurality of sources;
 - a time-independent calendar which handles other of the information units based on information stored about the plurality of sources and which places each source into a calendar location and which moves the source to a different place in the calendar after servicing the source; and
 - a mechanism for determining when a flow is added to the source whether that source was at a location in the time-based calendar and preventing the source from being placed at a location ahead of a calculated location in the time-based calendar.
2. A method of servicing data flows placed into a queue for service in turn comprising:
 - determining whether a queue had a previous position in a calendar;
 - if the queue had a previous position in the calendar, determining whether a new position which would be assigned to it is earlier than a previously calculated new position in the calendar;
 - if the new position which would be assigned is earlier than the previously calculated new position, using the previously calculated new position;
 - and, if the previously calculated new position is not earlier than the position which would be assigned, using the position which would be assigned.

3. A method including Claim 2 and further including considering the aging of the queue to determine whether the stored parameters remain valid.
5. The system of claim 1 wherein the plurality of sources include a plurality of queues.
6. The system of claim 1 or claim 5 wherein the calculated location includes the location whereat the queue would have been attached upstream from the location whereat said queue was last serviced.
7. The method of claim 2 wherein using includes attaching the queue to the selected location.
8. The method of claim 6 wherein the stored parameter includes time stamps.
9. A system comprising:
 - a time-based calendar which handles some of a plurality of information units based on the information stored about a plurality of sources; and
 - a mechanism for determining when a flow is added to a source whether that source was at a location in the time-based calendar and preventing the source from being placed at a location ahead of a predefined location in the time-based calendar.

10. A method comprising:
 - providing at least one time based calendar having a plurality of locations and a time pointer moving relative to the plurality of locations as a result of scheduler ticks;
 - attaching a queue to a first calendar location whereat the time pointer is pointing;
 - servicing said queue by causing a frame to be transmitted from said queue whereupon said queue goes empty;
 - identifying a second location whereat the queue would have been re-attached had it not gone empty;
 - examining pre-defined characteristics associated with said queue to determine occupancy frames within said queue;
 - if examination indicates the queue is not empty, identifying a current location whereat the time pointer points;
 - correlating the current location of the time pointer and the second location; and
 - selecting a location which is not earlier than the second location.
11. The method of claim 10 wherein the not emptied queue is attached to the selected location.
12. The method of claims 10 or 11 wherein the queue is attached by writing the i.d. (Identification number) of said queue in a stack located at each location.
13. The method of claim 12 wherein the stack is a Last In First Out (LIFO) stack.